What is claimed is:

1.   A system for providing video data, the system comprising:

        a decoder apparatus configured to receive a bitstream comprising compressed video data and an error vector index, and configured to output the video data in an uncompressed format; and

        a codebook comprising a set of error vectors and an error vector index associated with each error vector, each error vector in the set of error vectors comprising an array of predetermined motion compensation errors.

2.   The system of claim 1 wherein the decoder apparatus performs motion estimation and compensation on a pixel by pixel basis.

3.   The system of claim 2 wherein the decoder apparatus performs pel-recursive motion estimation to produce motion vectors for each pixel in a block.

4.   The system of claim 3 wherein the decoder apparatus generates reconstructed video data using the motion vectors for each pixel in the block and using the error vector provided by the codebook.

5.   The system of claim 1 wherein the array of predetermined motion compensation errors include a predetermined motion compensation error for each pixel in the block.

6.   The system of claim 1 further comprising a codeword decoder that decodes a codeword for the error vector index.

7.   A method for decoding video data, the method comprising:

        receiving a compressed bitstream containing the video data and an error vector index;

        converting the error vector index to an error vector, the error vector comprising an array of predetermined motion compensation errors;

        decoding a portion of the video data into an uncompressed format using the error vector; and

CISCP193/3930/JKW/WJP

outputting the video data in the uncompressed format.

8.   The method of claim 7 wherein the error vector is selected from a codebook comprising a set of error vectors using the error vector index.

9.   The method of claim 7 further comprising repeating converting the error vector index to an error vector for each block in a frame of video.

10.   The method of claim 7 wherein generating the video data portion includes performing motion estimation on each pixel in a block.

11.   The method of claim 10 wherein the motion estimation is pel-recursive motion estimation.

12.   The method of claim 7 wherein the portion is a block of pixels.

13.   The method of claim 7 further comprising decoding a codeword associated with the error vector index from the compressed bitstream.

14.   A system for providing a bitstream having compressed video data, the system comprising:

an encoder apparatus that receives uncompressed video data and outputs compressed video data, the encoder apparatus comprising:

a codebook comprising a set of error vectors and an error vector index associated with each error vector, each error vector in the set of error vectors comprising an array of predetermined motion compensation errors;

a local decoder that generates synthesized video data according to an error vector provided by the codebook.

15.   The system of claim 14 further comprising a system encoder that embeds a selected error vector index in the compressed video data.

CISCP193/3930/JKW/WJP

16.   The system of claim 14 wherein the local decoder performs motion estimation and compensation on a pixel by pixel basis.

5   17.   The system of claim 16 wherein the local decoder performs pel-recursive motion estimation to produce motion vectors for each pixel in a block.

18.   The system of claim 17 wherein the local decoder generates synthesized video data using the motion vectors for each pixel in the block and using the error vector provided by 10   the codebook.

19.   The system of claim 14 further comprising an error calculator that compares the synthesized video data produced by the local decoder with the uncompressed video data.

15   20.   The system of claim 19 wherein the error calculator produces a measure of synthesis error for a block of video data.

21.   The system of claim 14 further comprising a cost calculator that produces a synthesis cost based on a general distortion measurement.

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22.   The system of claim 14 further comprising an index selector that selects an output error vector index from the set of error vectors included in the codebook based on the cost of synthesized video produced by the local decoder.

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23.   A method for encoding video data, the method comprising:
        (a) generating synthesized video data for a portion of video data using predetermined motion compensation errors;
        (b) comparing the synthesized video data with raw video data for the portion to 30   generate a synthesis error for the portion; and
        selecting an error vector index for the portion based on the synthesis error.

24.   The method of claim 23 wherein the error vector index is selected from a codebook comprising a set of error vectors, each error vector in the set of error vectors comprising an array of predetermined motion compensation errors.

25.   The method of claim 24 further comprising repeating (a) and (b) for each error vector in the set of error vectors.

26.   The method of claim 23 wherein generating synthesized video data includes performing motion estimation on each pixel in a block.

27.   The method of claim 26 wherein the motion estimation is pel-recursive motion estimation.

28.   The method of claim 23 wherein the portion is a block of pixels.

29.   The method of claim 28 further comprising partitioning the video data into blocks.

30.   The method of claim 28 wherein the block has a rectangular or square shape.

31.   The method of claim 23 wherein the encoding is used within a multiple coding mode system.

32.   The method of claim 23 further comprising quantifying the synthesis error for the portion.

33.   The method of claim 23 further comprising embedding the error vector index into a compressed bitstream.

34.   A codebook for use in encoding and decoding video data, the codebook comprising a set of error vectors and an error vector index associated with each error vector, each error vector in the set of error vectors comprising an array of predetermined motion compensation errors.

35.   The system of claim 34 wherein each error vector in the set of error vectors is determined using an updated cluster center.

36.   The system of claim 34 wherein the array of predetermined motion compensation errors includes a predetermined motion compensation error for each pixel in a block of video data.

37.   The system of claim 34 wherein the codebook includes between about 256 error vectors and about 4096 error vectors.

38.   The system of claim 37 wherein the codebook includes between about 512 error vectors and about 2048 error vectors.

39.   The system of claim 34 wherein the codebook includes a codeword for each error vector.

40.   A method for constructing a codebook, the codebook comprising a set of error vectors and an error vector index associated with each error vector, each error vector in the set of error vectors comprising an array of predetermined motion compensation errors, the method comprising:

    (a) generating a cluster center for each error vector in the codebook;

    (b) receiving a set of motion compensation error blocks;

    (c) assigning each of the motion compensation error blocks to a cluster;

    (d) updating the cluster center for each error vector in the codebook to form a new cluster center for each error vector in the codebook; and

    (e) designating the new cluster center for each error vector in the codebook as the array of predetermined motion compensation errors for each error vector in the codebook.

41.   The method of claim 40 wherein assigning each of the motion compensation error blocks to a cluster comprises determining a quantitative difference between a block of motion compensation errors and a cluster center.

42.   The method of claim 40 wherein the cluster centers are generated randomly.

43.   The method of claim 40 further including repeating (c) and (d).

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44.   A system for providing video data, the system comprising:

means for receiving a compressed bitstream containing the video data and an error vector index;

means for converting the error vector index to an error vector, the error vector

10   comprising an array of predetermined motion compensation errors;

means for decoding a portion of the video data into an uncompressed format using the error vector; and

means for outputting the video data in the uncompressed format.

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45.   A system for encoding video data, the system comprising:

means for generating synthesized video data for a portion of video data using predetermined motion compensation errors;

means for comparing the synthesized video data with raw video data for the portion to

20   generate a synthesis error for the portion; and

selecting an error vector index for the portion based on the synthesis error.

46.   A computer readable medium including instructions for decoding video data, the

25   instructions comprising:

instructions for receiving a compressed bitstream containing the video data and an error vector index;

instructions for converting the error vector index to an error vector, the error vector comprising an array of predetermined motion compensation errors;

30   instructions for decoding a portion of the video data into an uncompressed format using the error vector; and

instructions for outputting the video data in the uncompressed format.